Small Business Innovation Research/Small Business Tech Transfer

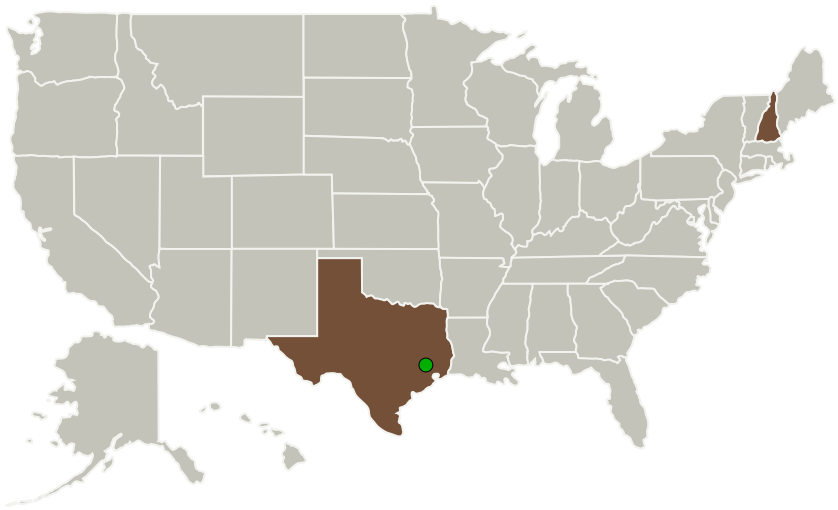
Multipurpose Cooling Garment for Improved Space Suit Environmental Control, Phase I

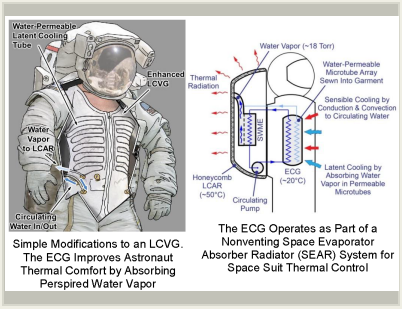
Completed Technology Project (2014 - 2014)

Project Introduction

Future manned space exploration missions will require space suits with capabilities beyond the current state of the art. Portable Life Support Systems for these future space suits face daunting challenges, since they must maintain healthy and comfortable conditions inside the suit for long-duration missions while minimizing weight and water venting. We propose to develop an innovative, multipurpose garment for thermal and humidity control inside a space suit pressure garment that is simple, rugged, compact, and lightweight. Our approach is to make simple modifications to a conventional liquid cooling and ventilation garment (LCVG) so that it can directly absorb latent heat as well as sensible heat. This hybrid garment will prevent buildup of condensation inside the pressure garment, prevent loss of water by absorption in regenerable CO2 removal beds, and conserve water through use of Creare's lithium chloride absorber/radiator (LCAR) technology for nonventing heat rejection. In Phase I we will prove the feasibility of our approach by sizing the critical components for the hybrid garment, developing fabrication methods, building and testing a proof-of-concept system, and demonstrating by test that its performance is suitable for use in space suit life support systems. In Phase II we will optimize the overall design for integration with space suit systems, produce a full-size prototype garment, and demonstrate operation in a prototypical environment.

Primary U.S. Work Locations and Key Partners





Simple Modifications to an LCVG. The ECG Improves Astronaut Thermal Comfort by Absorbing Perspired Water Vapor

The ECG Operates as Part of a Nonventing Space Evaporator Absorber Radiator (SEAR) System for Space Suit Thermal Control

Multipurpose Cooling Garment for Improved Space Suit Environmental Control Project Image

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Organizations Performing Work	Role	Type	Location
Creare LLC	Lead Organization	Industry	Hanover, New Hampshire
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
New Hampshire	Texas

Project Transitions

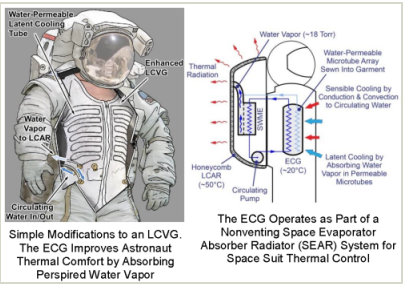
June 2014: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137768)*

Images



Project Image

Multipurpose Cooling Garment for Improved Space Suit Environmental Control Project Image *(https://techport.nasa.gov/image/126442)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Creare LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

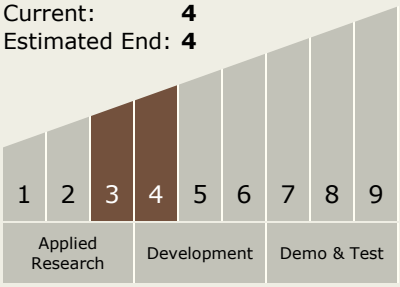
Carlos Torrez

Principal Investigator:

Michael G Izenson

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.2 Extravehicular Activity Systems
    - TX06.2.2 Portable Life Support System

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System